

## AO-92 L/V Adventure

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Over the past decade or so since I started working satellites, I have expanded my knowledge and tried different modes and configurations. After beginning with FM satellites in late 2005, I added SSB/CW and packet (1200bps and, with FalconSAT-3, 9600bps), as well as working ISS packet on 70cm in late 2016 and early 2017. Starting in 2006 with AO-51's V/S mode, I used an S-band down-converter to work that mode when it was active. I wrote an article about my first AO-51 V/S experiences, which appeared in the November/December 2006 AMSAT Journal. With AO-92's arrival early in 2018, I am now working the L/V mode. So far with AO-92, I have found it doesn't take much to be heard in this mode and to be successful making contacts.

After AO-92's launch and testing before the satellite was opened for general use, stations were testing the L/V mode with a variety of station configurations. Some had purchased the 16-element Comet CYA-1216E Yagi, and adding the 2m elements from the Arrow dual-band Yagi, to make a dual-band L/V Yagi. A few were using HTs like the Alinco DJ-G7T with 1W transmitter power, and one station even worked the L/V mode with a DJ-G7T and its stock duckie. As I saw these reports, I started digging through my garage to cobble together something for the 1.2 GHz uplink. I didn't want to buy the Comet antenna, if I could get on the 1.2 GHz uplink with equipment I already had.

I bought an Alinco DJ-G7T HT when they debuted at Dayton in 2009. Not a great performer for V/U FM satellites, OK for U/V FM satellites, but the 1.2 GHz part is what I was interested in with AO-92. I also found a Diamond tri-band 2m/70cm/23cm whip antenna, an RH951S, and was ready for the first day when AO-92 was open for general use in the L/V mode, a Sunday morning - 4 February 2018 (Super Bowl Sunday). I hoped I might have some success, based on seeing reports of others using the same HT during the earlier testing, but I was not successful on the first pass. I went back to my garage, trying to see if I could find a box with more 1.2 GHz stuff I had, and found a very old Comet CY-1205 5-element Yagi I bought in the 1990s. My CY-1205 had a

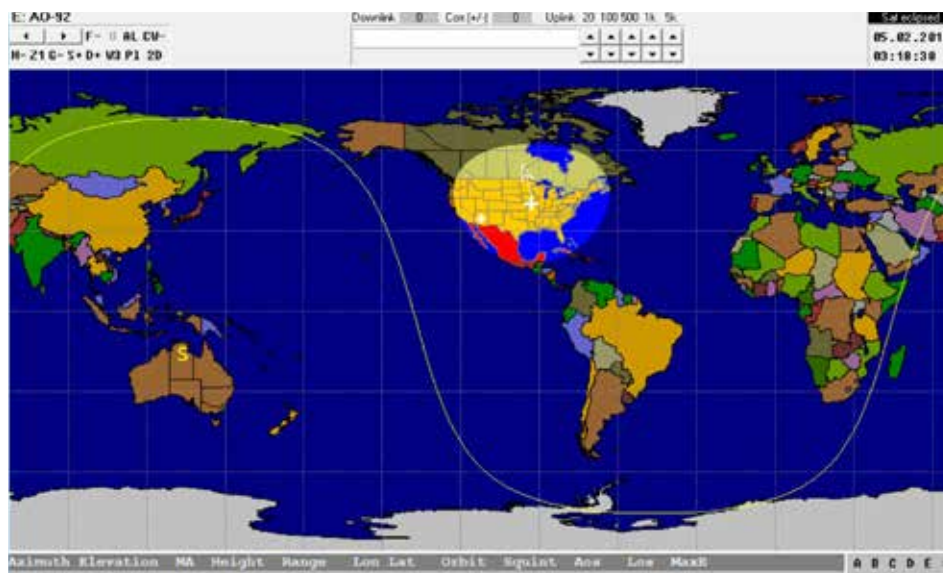


**WD9EWK holding Alinco DJ-G7T HT with Comet CY-1205 5-element Yagi in left hand and Elk log periodic in right hand (connected to TH-D74 clipped on belt).**

BNC connector on it, and there also was a version sold in the late 1980s and early 1990s with a TNC connector instead of a BNC. I put this on my DJ-G7T, and proceeded to try a western pass late that morning. No QSOs then, but there were a couple of passes that evening I wanted to try with the Alinco HT and short Yagi.

I wanted to park at a freeway rest area north of Phoenix along I-17 in grid DM34, where I go when I want a clearer view of the sky with virtually no noise or interference. One problem - with the Super Bowl in progress, all of the parking spaces were filled with cars and trucks, and I could see some TVs in those vehicles tuned to the game. I had to go another 10 miles north, still in DM34,

and park in a large lot behind a truck stop to get a good spot. I had a 7-degree pass to the east and heard several stations on as AO-92 rose from behind some hills. Around the midpoint of the pass, I made two quick QSOs with Glenn, AA5PK, in Texas and Jeff, WB8RJY, in Michigan. I waited 90 minutes for the next pass, which had a maximum elevation of 61 degrees. I heard Jerry, N0JY, in Texas early in the pass, but was not able to make contact with him. A couple of minutes later, I started hearing Greg, KO6TH, in northern California and made a contact with him. After that, I made a brief contact with Patrick, AD5MT, in southern California, and resumed talking with KO6TH. Greg and I were calling out the elevation and uplink frequency as AO-



**AO-92 footprint on 5 February 2018 at 0318 UTC. Most of the continental USA is covered, favoring the east coast.**



92 approached LOS for our locations, and I was still getting through as the elevation approached 5 degrees. Since I wasn't watching the Super Bowl, this was a fun way to spend a Sunday evening.

Since that Sunday, I have tried to get on at least one AO-92 L/V pass every weekend. Most of the time, I have worked these L/V passes from home. For one pass in mid-March, I was in Tucson at a science fair on the University of Arizona campus and worked a couple of stations from there. I have also added a Chinese-made 10-element Yagi I ordered from eBay, which cost about \$50 including shipping from the Far East. I have to be more accurate in pointing the larger antenna, but it has worked as an uplink antenna with my DJ-G7T.

There are also designs for 1.2 GHz Yagis on the Internet. As with the "Cheap Yagis" many use for V/U and U/V satellites, two of these articles were written by Kent Britain, WA5VJB. One of these articles has a design for smaller 1.2 GHz Yagis, of 4 to 10 elements: [www.n5dux.com/ham/files/pdf/D-STAR%20Antennas.pdf](http://www.n5dux.com/ham/files/pdf/D-STAR%20Antennas.pdf).

The other WA5VJB article has a design for a 17-element 1.2 GHz Yagi: [wa5vjb.com/references/LBand-Yagis-for-AMSAT.pdf](http://wa5vjb.com/references/LBand-Yagis-for-AMSAT.pdf).

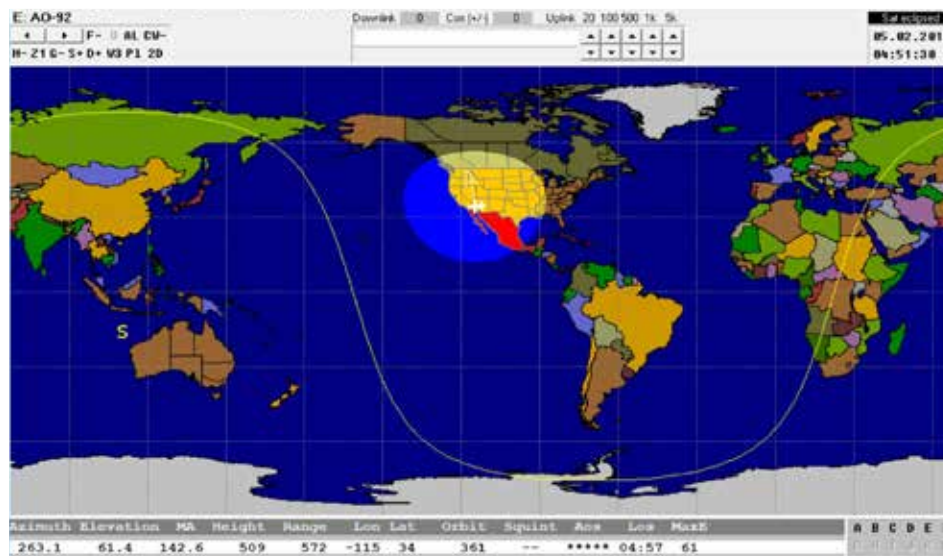
Along with the radio and antennas, tuning the 1.2 GHz uplink is a challenge. I tune across 60 kHz in a matter of 10 to 12 minutes. Unlike how I tune for Doppler with V/U or U/V satellites, I find I have to go slower with the tuning near AOS and LOS, but tune faster as the satellite goes through the middle of the pass.

Also keeping in mind that the center frequency for AO-92 is around 1267.358 MHz instead of 1267.350 MHz which was published before AO-92's launch, helps with tuning. For the radios like my DJ-G7T with 5 kHz steps, I consider 1267.360 MHz as the center frequency for my tuning. When I realized I had to change how I tuned for Doppler, in addition to tuning across a larger range than I would for 70 cm, I have been able to work most passes even at lower elevations.

After 3 months of AO-92's L/V mode, I still see questions like: "Can AO-92 L/V be worked with a 1-watt HT?" in different venues. The answer is definitely "yes," provided some antenna gain is added to the 1 W transmitter power, and preferably a directional antenna is used with the HT. At home and from a few locations away from home, I have worked 18 different stations

around the continental USA so far in the L/V mode. Most are in the west, but I have had QSOs with stations near the east coast like N8HM in Washington DC and N1JEZ in Vermont from central Arizona, and have heard a couple of Canadian stations on some L/V passes.

With Fox-1Cliff and the European ESEO satellites due to be launched later in 2018, we may have 3 different satellites with L/V capabilities. Fox-1Cliff will be like AO-92, where the L/V mode can be turned on by a command station, but ESEO will only have an FM repeater in L/V mode. If these satellites can hear the uplink signals from stations like mine, there will be more L/V fun in the near future. 🌐



AO-92 footprint on 5 February 2018 at 0451 UTC. The west coast, and much of the continental USA, are covered.



Kenwood TH-D74 connected to Elk log periodic, Alinco DJ-G7T connected to 10-element 1.2 GHz







Alinco DJ-G7T with Comet CY-1205 1.2 GHz Yagi, Kenwood TH-D74 with Elk log periodic



Closeup of Alinco DJ-G7T with Comet CY-1205 1.2 GHz Yagi, Kenwood TH-D74 with Elk log periodic. This pass favored the west coast.



WD9EWK standing in front of his house, working AO-92 L/V. The DJ-G7T is in his left hand, with the Comet CY-1205 Yagi. The Elk log periodic is in his right hand, connected to a TH-D74 on his belt. This pass favored the west coast.